

## The Role of Planetary Dust and Regolith Mechanics in Technology Developments at NASA

One of NASA's long term goals continues to be the exploration of other planets and orbital bodies in our solar system. Our sustained presence through the installation of stations or bases on these planetary surfaces will depend on developing properly designed habitation modules, mobility systems and supporting infrastructure. NASA Glenn Research Center is involved in several technology developments in support of this overarching goal. Two key developments are in the area of advanced filtration and excavation systems. The first addresses the issues posed by the accumulation of particulate matter over long duration missions and the intrusion of planetary dust into spacecraft and habitat pressurized cabins. The latter supports the operation and infrastructure of in-situ resource utilization (ISRU) processes to derive consumables and construction materials from the planetary regolith. These two developments require a basic understanding of the lunar regolith at the micro (particle) to macro (bulk) level. Investigation of the relevant properties of the lunar regolith and characterization of the standard simulant materials used in testing were important first steps in these developments. The fundamentals and operational concepts of these technologies as well as descriptions of new NASA facilities, including the Particulate Filtration Testing and the NASA Excavation and Traction Testing facilities, and their capabilities for testing and advancing these technologies will be presented. The test data also serves to validate and anchor computational simulation models.

### Bio:

Dr. Juan H. Agui has a Ph.D in Mechanical Engineering from the City University of New York and is currently a research scientist at the NASA Glenn Research Center. He has led and supported several important research projects at NASA. Through his projects at NASA he has gained experience in the fields of complex fluids, granular materials, and aerosol science. He has been a technical monitor for numerous NASA sponsored grants and contracts and a project scientist for the flight project "Investigating the Structure of Paramagnetic Aggregates from Colloidal Emulsions" (InSPACE). Currently, he is developing technologies in support of NASA's exploration mission in the area of life support systems and In-Situ Resource Utilization. He leads the development of advanced spacecraft filtration systems. This task is charged with developing, assessing, and testing the next-generation space-rated filters for crewed compartments for NASA's future exploration missions. He also supports the development and testing of geotechnical tools and excavation systems for planetary surface missions.